APPENDIX 2-J

COST ESTIMATE FOR SAN FRANCISCO BAY CROSSING

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Cost Assumptions

- High level rail bridges:
  - Newark Slough Bridge needs about 40 feet clearance and 180-foot span.
  - San Francisco Bay Main Channel Bridge needs a clearance equal to the parallel State Route 84 (SR-84) highway bridge, or 85 feet clearance and a 340-foot span.
- Alignment shown in the *California High-Speed Rail Corridor Evaluation Final Report* (December 30, 1999) connecting Fremont/Newark with Redwood City via the Dumbarton Rail Corridor. The section of open water and of marshy land is roughly 29,000 feet long, extending from roughly University Avenue in the West Bay to Hickory Street in the East Bay. Along this section the construction of a high-speed facility would either be a structure or would involve special soil consolidation.
- Costs are in 2002 dollars and based on the Korve/PB Bay crossing study.
- Assume existing Dumbarton Rail bridge and Newark Slough bridge structures and approaches would remain for other passenger/commuter rail uses.
- Saltwater Marsh section in the areas approximately between University and Bridge (westbay) and Hickory and Bridge (east bay) is on low-level structure (trestle) to minimize environmental impacts on the wetland area (tidal flow, habitat, etc.).
- Desired top speed is the same as along the Peninsula—125 miles per hour (mph). The Bay crossing study designed heavy rail structures for 80 mph trains. Unit costs were adjusted accordingly for upgraded design criteria and crossing dimensions, as summarized below.

Geometric Criteria

Minimum criteria	125 mph design speed (feet)
Sag Curve Radius	34688
Crest Curve Radius	52031
Vertical Curve Length	548
Constant Grade Tangent Length	548

Dimensions

	125 mph design speed
Main Channel Bridge	
Estimated maximum grade	2.3%
Length over water	7,970 feet
Length over land	3,060 feet
Total Length	11,030 feet
Newark Slough Bridge	
Estimated maximum grade	1.5%
Length over water	425 feet

	125 mph design speed
Length over land	6,340 feet
Total Length	6,340 feet
At-grade section requiring soil consolidation	**11,630 feet**
Total crossing	**29,000 feet**

- To accommodate construction for 125 mph trains with HST tolerances/standards, a 15 to 20% factor was added to unit costs.
- Per report, a 25% contingency and 25–30% project delivery costs was included.
- Costs do not include environmental mitigations (e.g., wetland replacement). Based on the mitigation costs estimated for current projects affecting the Bay (San Francisco International Airport [SFO] runway extension), the mitigation costs could reach as high as $1 billion, nearly doubling the cost of the infrastructure.

Conceptual Cost Estimate for Bay Crossing Near Dumbarton

Unit Costs

Type of Construction	Unit	Unit Price Range
San Francisco Bay Crossing Study Major Conventional Rail Bridge (2-track) Mid-Bay Crossing north of San Mateo Bridge (2002 dollars)		
Trestle over Water*	Route Foot	$ 9,500 to $ 11,400
High Bridge over Water*	Route Foot	$ 48,000 to $ 58,000
Main Span over Navigation Channel*	Route Foot	$ 161,000 to $ 193,000
Modified unit costs for Dumbarton Bridge area		
Trestle over salt water marsh land*	Route Foot	$ 9,000 to $ 10,000
Trestle over salt water marsh land	Route Foot	$ 8,460 to $ 9,460
High Bridge over marsh land 40 foot clear*	Route Foot	$ 14,340 to $ 16,140
High Bridge over marsh land 80 foot clear*	Route Foot	$ 19,940 to $ 22,540

Note:
* Construction totals include track and overhead contact system.

Cost Estimate (125 miles per hour)

Type of Construction	Quantity	Unit	Total Construction Costs
Main Channel Bridge			
Trestle over Water	2007	Route Foot	$ 19,066,500 to $ 22,879,800
High Bridge over Water	5623	Route Foot	$ 269,904,000 to $ 326,134,000
High Bridge over marsh land - 80 ft	3063	Route Foot	$ 61,076,220 to $ 69,040,020
Main Span over Navigation Channel	340	Route Foot	$ 54,740,000 to $ 65,620,000
Subtotal	11033		$ 404,786,720 to $ 483,673,820
Newark Slough Bridge			

Type of Construction	Quantity	Unit	Total Construction Costs				
Trestle over marsh land	2957	Route Foot	$	26,613,000	to	$	29,570,000
High Bridge over Water	427	Route Foot	$	20,496,000	to	$	24,766,000
High Bridge over marsh land—40 ft	2957	Route Foot	$	42,403,380	to	$	47,725,980
Subtotals	6341		$	89,512,380	to	$	102,061,980
Low-Level Trestle over marsh land	11626	Route Foot	$	98,355,960	to	$	109,981,960
Construction totals	29000	Route Foot	$	592,655,060	to	$	695,717,760
High Speed Factor 15 to 20%			$	88,898,259	to	$	139,143,552
			$	681,553,319	to	$	834,861,312
Contingency 25%			$	170,388,330	to	$	208,715,328
Subtotals			$	851,941,649	to	$	1,043,576,640
Project Delivery 25 to 30%			$	212,985,412	to	$	313,072,992
Totals			**$**	**1,064,927,061**	**to**	**$**	**1,356,649,632**